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WAX AND RELATED COATINGS FOR HORTICULTURAL PRODUCTS

—A BIBLIOGRAPHY—

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service

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WAX AND RELATED COATINGS FOR HORTICULTURAL PRODUCTS

-- A BIBLIOGRAPHY --

By
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INTRODUCTION

This list of 292 references was prepared to aid research workers contemplating further work on use of wax, wax emulsions, or related coatings for horticultural products. It also is intended as a correspondence aid and to answer other requests for information on the subject. No doubt some significant contributions on waxing fruits, vegetables, and nursery stock have been overlooked, as titles often do not tell the full scope of the investigations or of products tested.

The technology of using wax to prolong the life of fruits is not new. The Chinese experimented with molten wax dips for oranges and lemons in the 12th and 13th centuries (1).[2] They discovered that this caused the fruit to ferment. They then developed a method of applying wax with brushes. As better results were obtained, they experimented with other fruit. Waxing of citrus has now become commonplace. The possibilities of waxing vegetables, apparently was first reported in 1935 by Harvey and Landon (216), who showed that water losses from winter squash could be markedly reduced by waxing. However, tomatoes and some other vegetables were probably waxed earlier than this.

Horticultural crops may be waxed for a variety of reasons, but most commonly they are waxed to retard evaporation and transpiration losses from tissues that lead to wilting, shriveling, and general shrinkage. Excessive moisture loss makes products unattractive to consumers and survival of nursery stock is impaired. The wax coating should not be so thick as to unduly interfere with respiration, ripening, or other metabolic processes as injury may result. However, root crops such as rutabagas, with a relatively low respiration rate, may receive a fairly thick paraffin coating and remain uninjured in storage.

Some horticultural crops are waxed to improve their luster or natural appearance. Others are coated in an attempt to prevent deterioration, such as decay, physiological breakdown, sprouting, aging, and color changes. For this purpose other chemicals such as fungicides, bactericides, growth regulators, and senescence inhibitors may be incorporated in the wax formulation. Citrus is often treated with a high gloss fungicidal wax for three benefits: To reduce moisture loss, to retard decay, and to improve appearance (103). For still other fruits and vegetables, a wax coating may serve as a lubricant to reduce scarring or chaffing during marketing.

At least eight methods of applying wax have been developed to obtain desired results. Some involve fairly elaborate equipment as illustrated by Hartman and Isenberg (182). The wide range in texture of surface tissues of different products (oranges, peppers, cantaloups, rose bushes) helps explain why no single application method or type wax is best for all. Some products have a good natural protective skin and would benefit little, if any, from added wax. Application methods include dipping

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[2] Numbers in parentheses refer to specific references given in the report.

products into cold wax emulsions, dipping briefly into hot melted paraffin, spraying with wax emulsions, foaming and dripping wax emulsions onto rotating brushes, and using solid cake wax against rotating brushes, which coat and polish a product at the same time.

Waxes have been tested on many kinds of produce and nursery stock as shown in this bibliography. Commercial use, however, is relatively limited. The waxing process is recommended only where research has shown benefits, such as reduced shriveling or improved appearance. Waxing is recommended only on good quality products; it does not improve the quality of inferior products. Sometimes it increases decay. Deterioration resulting from defects, injury, and disease is likely to progress regardless of whether products have been wax-treated.

Horticultural crops commonly waxed include tomatoes, peppers, citrus, cantaloups, cucumbers, rutabagas, rose bushes, and numerous kinds of trees and shrubs during storage or transplanting. Other crops occasionally given a wax coating include turnips, parsnips, carrots, eggplants, small summer squash, winter squash, potatoes, sweetpotatoes, nectarines, apples, pears, and honeydew melons. Waxing of leafy vegetables and of bunched root crops has given unfavorable results (183). Extensive information on waxing nursery stock, dormant fruit trees, cion wood, and cuttings is given in (248) and (250).

References of a general nature on wax and related coatings for horticultural crops, which detail both experimental benefits and problems encountered, include (1, 3, 5, 8, 17, 18, 28, 40, 41, 44, 45, 71, 96, 101, 103, 182, 183, 248, 250, 256). Some of these reports are no longer available from the author or institution but may be found in libraries.

Food and Drug Administration (Department of Health, Education and Welfare) regulations on the use of food coatings, petroleum wax, petrolatum, and so forth, are given in (287) and (288).

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SOURCES OF HORTICULTURAL WAXES AND RELATED MATERIALS[3]

Aeroglide Corp., 510 Glenwood Ave., Raleigh, N. C. 27603

Bartlett Mfg. Co., 3001 E. Grand Blvd., Detroit, Mich. 48202

Brogdex Co., 1441 W. Second St., Pomona, Calif. 91766

Concord Chemical Co., 205-2nd St., Camden, N.J. 08101

Dow Chemical Co., Midland, Mich. 48640

Ever-Plastics Corp., 420 Lexington Ave., New York, N.Y. 10017

E-Z-Flo Chemical Co., P.O. Box 337, Aberdeen, N.C. 28315

FMC Corporation, Florida Division, Box 1708, Lakeland, Fla. 33802

Franklin Research Corp., 5134 Lancaster Ave., Philadelphia, Pa. 19131

Humble Oil & Refining Co., P.O. Box 2180, Houston, Tex. 77001

International Wax Refining Co., Valley Stream, N.Y. 11580

Johnson, S. C. and Son, Inc., Agricultural Wax Dept., 1525 Howe St., Racine, Wis. 53403

Kalamazoo Paraffine Co., 1809 Reed St., Kalamazoo, Mich. 49001

Lobee Pump & Machinery Co., Gasport, N.Y. 14067

Lockwood Division, Seilon, Inc., Gering, Neb. 69341

Michel & Pelton Co., Inc., 5743 Landregan St., Oakland, Calif. 94608

Midwestern Machine Co., Belding, Mich. 48809

Mobil Chemical Co., Agricultural Chemicals Division, 401 E. Main St., Richmond, Va. 23208

National Wax Co., 3650 Touhy Ave., Skokie, Ill. 60076

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Nursery Specialty Products, Inc., 202 East 47th St., New York, N.Y. 10017
Petrolite Corp., Bareco Division, 6910 E. 14th St., Tulsa, Okla. 74115
Pomona Service & Supply Co., 2310 Fruitvale Blvd., Yakima, Wash. 98902
Ross, Frank B. Co., 403 Pine St., Jersey City, N.J. 07304
Sun Oil Co., Industrial Products Dept., Philadelphia, Pa. 19103
Trescott Company, Fairport, N.Y. 14450
Tri-Pak Machinery Service, Inc., 112 Coombs Hwy., Harlingen, Tex. 78551
Wallace and Tiernan, 1713 S. California Ave., Monrovia, Calif. 91016

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Aeroglide Corporation, 510 Glenwood Ave., Raleigh, N.C. 27603
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American Machinery Corp., Box 3228, Orlando, Fla. 32802
Boggs Manufacturing Corporation, Atlanta, N.Y. 14828
Brogdex Co., Box 2769 Pomona, Calif. 91766
Durand Machinery, Inc., Woodbury, Ga. 30293
FMC Corporation, Florida Division, Box 1708, Lakeland, Fla. 33802
Lobee Pump & Machinery Co., Gasport, N.Y. 14067
Lockwood Division, Seilon, Inc., Gering, Neb. 69341
Michigan Orchard Supply Co., South Haven, Mich. 49090
Midwestern Machine Co., Belding, Mich. 48809
Tew Manufacturing Co., Fairport, N.Y. 14450
Trescott Co., Fairport, N.Y. 14450
Tri-Pak Machinery Service, Inc., 112 Coombs Hwy., Harlingen, Tex. 78550
Troyer Manufacturing Co., Box 7, Smithville, Ohio 44677
Wallace and Tiernan, 1713 S. California Ave., Monrovia, Calif. 91016
Wayland Machinery Co., Covesville, Va. 22931

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